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Wasting the Future: The Technological Sublime, Communications Technologies, and E-waste

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Abstract

Literally speaking, e-waste is the future of communications. E-waste is the fastest growing waste stream in the world, much of it communications technologies from cell phones to laptops, televisions to peripherals. As a result of policies of planned obsolescence working computers, cell phones, and tablets are routinely trashed. One of the most powerful and enduring discourses associated with emerging technologies is the technological sublime, in which technology is seen as intellectually, emotionally, or spiritually transcendent. It comprises a contradictory impulse that elevates technology with an almost religious fervor, while simultaneously overlooking some of the consequences of industrialism, as well as ignoring the necessity of social, economic, and governmental infrastructures necessary to the implementation and development of new technologies. The idea that a new technology will not pollute or harm the environment is a persistent, though often quickly passed over, theme in the technological sublime, echoed in discourses about emerging technologies such as the silicon chip, the internet, and other ICTs. In this paper, I make connections between the discourse of newness, the practice of planned obsolescence, and the mountains of trashed components and devices globally. Considering the global context demonstrates the realities of the penetration of ICTs and their enduring pollution and negative implications for the health of humans and nonhumans, including plants, animals, waterways, soil, air and so on. I use the discourse of the technological sublime to open up and consider the future of communications, to argue that this discourse not only stays with us but also contains within it two important and related components, the promise of ecological harmony and a future orientation. I argue that these lingering elements keep us from considering the real future of communications – e-waste – and that, as communications scholars, we must also engage with waste management literature and practices if we take the future of communications seriously.

Keywords

e-waste, technological sublime, future, communication technologies

When we discuss the future of communication, the focus is often on technologies and markets, predicting trends, developments, and innovations. The future of communication is not simply how we will communicate in the near or distant future or which technologies, software, and hardware we will be using or will have become obsolete. It is more than the whims of the market, emerging markets, or innovations to existing technologies to make them better, faster, and smaller. Given our reliance on communications technologies, e-waste is literally the future of much communication. Waste has become a defining, yet often unspoken, problem in information society. Scientists at the United Nations University in Tokyo do life cycle analyses of high tech devices in order to enumerate the amount resources used in their production and they estimate that 240 kilograms of fossil fuel, 22 kilograms of chemicals, and 1500 kilograms of water are required to make every desktop computer.[1] Multiply this figure by current consumption levels, and add to it the growth from emerging markets, including the increase in resource consumption, pollution, and waste, and it is clear that the future of communication must include an analysis of the environmental impacts of communications technologies.

E-waste is the fastest growing waste stream in the world, much of it communications technologies from cell phones to laptops, televisions to peripherals. Jonathan Sterne shows that computers and other devices "are designed to be trash, to make room for future profits, additional hardware sales, and performance upgrades."[2] These devices are usually only 'new' for about six months, after which the monetary value of the machine drops significantly, although typically it still functions as intended. As a result of this policy of planned obsolescence working computers, cell phones, and tablets are routinely trashed. Lisa Parks establishes that distinctions between 'old' and 'new' media technologies are directly linked to the corporate policy of planned obsolescence, so that when studying so-called 'new' media we must be alert to corporate agendas as we scramble to account for and theorize those changes.[3] With the exciting and rapid changes to communication technologies, and perhaps because we are trying to analyse them at the same exhilarating speed of those transformations, there are aspects of information and communications technologies (ICTs) that remain radically under-theorized, namely their environmental effects.

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[1] Rüdiger Kuehr and Eric Williams, *Computers and the Environment: Understanding and Managing Their Impacts* (Boston: Kluwer Academic Publishers, 2003), 67-8.

[2] Jonathan Sterne, "Out with the Trash: On the Future of New Media," in *Residual Media*, ed. Charles R. Acland (Minneapolis: University of Minnesota Press, 2007), 33-5.

[3] Lisa Parks, "Falling Apart: Electronics Salvaging and the Global Media Economy," in *Residual Media*, ed. Charles R. Acland (Minneapolis: University of Minnesota Press, 2007), 33.

This paper outlines how we might incorporate this neglected avenue into our understandings of communication, communications technologies, and their futures. I make connections between the discourse of newness, the practice of planned obsolescence, and the mountains of trashed components and devices globally. Considering the global context demonstrates the realities of the penetration of ICTs and their enduring pollution and negative implications for the health of humans and nonhumans, including plants, animals, waterways, soil, and air. I use the discourse of the technological sublime to open up and consider the future of communication, to argue that this discourse not only stays with us but also contains within it two important and related components, the promise of ecological harmony and a future orientation. I argue that these lingering elements keep us from considering the real future of communications – e-waste – and that as scholars of communication we must also engage with waste management literature and practices if we take the future of communication seriously.

Before continuing, I pause to clarify how the terms information and communications technologies and new media technologies will be used in this paper. To some extent, I will keep my definitions open and overlapping in order to accommodate the breadth of discourse with regards to both the technological sublime and e-waste, which are the two main sites of my argument. Many critics have noted the imprecision of the term new media, which ostensibly refers to digital technologies, and I exercise it cautiously. I employ this term to emphasize the slipperiness of the shifting discourse of newness as it relates to media and communications technologies.[4] My focus in this paper will be on computers and the internet, as representative of the changes associated with information society. I use the term ICT broadly to indicate the large variety of communications technologies including computers and the internet, but also fax machines, phones, video games, film, television and so on that are outside the scope of this paper, but relevant to its larger themes. As communications technologies, their use, content, or programming often contribute to the larger discourses of progress, democracy, economics, and the environment, which are also connected to the discourse of the technological sublime. In disposal, they all become components in e-waste, or waste electronic and electrical equipment. In what follows, I consider the discourse of the technological sublime in order to examine the social progress that ICTs and computers are said to bring with them. In particular, I examine how the claim for increased ecological harmony is often repeated alongside claims about the supposed democratization that new technologies will bring.

[4] See Jonathan Sterne (2007), Lisa Parks (2007), Carolyn Marvin (1990), and Lisa Gitelman and Geoffrey Pingree (2003) for nuanced discussions of the term 'new media.'

Claire Pajaczkowska observes that the return to the sublime in the seventeenth and eighteenth century coincides with a larger re-evaluation of nature, moving from an appreciation of nature as agrarian and orderly to a pleasure with the wildness of nature, and coinciding with the increasing technological control of the environment.[5] David Nye says:

> After centuries of neglect, the sublime – first described in classical antiquity – reemerged in the eighteenth century in tandem with the apotheosis of reason and the advent of industrialization. This broken figure of thought, which permitted both the imagination of an ineffable surplus of emotion and its recontainment, was not based on a perceived opposition between nature and culture...[6]

He argues that Americans looked both to nature and the technological for sublimity and that the sublime has a particular place in the American nation building project.[7] In the American technological sublime of the nineteenth century, nature and industry are not seen as antagonistic; rather they are coextensive so that the preservation and transformation of the land are part of the modernizing project.[8] As I will discuss below, the technological sublime has always contained within it notions of harmony between nature and technology.

It was Perry Miller, in his book *The Life of the Mind in America,* who first applied the sublime to technology, but it is Leo Marx who further developed the concept in his book *The Machine in the Garden*. According to Marx, the technological sublime "arises from an intoxicated feeling of unlimited possibility" where machines, and technology in general, are said to advance human progress.[9] David Nye has the most thoroughly articulated discussion of the technological sublime in his book *American Technological Sublime*. For both Marx and Nye, the rhetoric of the technological sublime comprises a contradictory impulse that elevates technology with an almost religious fervor, while simultaneously overlooking some of the consequences of industrialism, as well as ignoring the necessity of social, economic, and governmental infrastructures necessary to the

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[5] Claire Pajaczkowska, "Introduction to Part 1," in *The Sublime Now*, eds. Claire Pajaczkowska and Luke White (Newcastle upon Tyne: Cambridge Scholars Publishing, 2009), 19.

[6] David Nye, *American Technological Sublime* (Cambridge, Massachusetts: MIT Press, 1994), 282.

[7] Ibid. It is worth noting that the reaction to industrialization in England, and elsewhere, included concerns that mechanization would depose the working classes while bringing wealth to the rich. This can be seen in the comparison of machines to monsters in the works of Dickens, for example. See ibid., 54.

[8] Ibid., 37.

[9] Leo Marx, *The Machine in the Garden: Technology and the Pastoral Ideal in America* (New York: Oxford University Press, 1964), 198.

implementation and development of new technologies.[10] In general, once a technology ceases to be new and enters the banal, ubiquity of daily routine, the promises for human progress related to the discourse of the technological sublime also fade. Jonathan Sterne's discussion of the 'newness' of new media is instructive here. He reminds us that computers, unlike other mediums such as radio or television, are still called 'new' forty years after their initial introduction.[11] Because newness is the condition upon which the discourse of the technological sublime is necessitated, the continued appellation of those machines as new has important ramifications for how we understand and interact with these technologies. This constant state of supposed newness, and the illogical classification of these machines as 'new' media technologies, means that the discourse of technological sublime remains with us.

Vincent Mosco examines the mythology surrounding the internet and cyberspace, in what he calls the digital sublime, to consider how these ideas shape social reality. James Carey and John Quirk go even further back and situate the internet in a lineage of earlier electronic technologies including electricity, electric power, electronics, cybernetics, computers, and information technologies. Their distinction jibes in important ways with the overlapping concerns between ICTs and electronic waste, making important connections between industrial, consumer, and information societies. For Carey and Quirk, the myth of the electrical sublime insists that electronic technologies rejuvenate community and politics, enable ease of communication, and decentralize bulky governmental and other social institutions. In reality, the advent of electricity and related technologies in the US actually recentralizes power in organizations such as the Pentagon, NASA, GE, and others charged with the creation and maintenance of the energy grid, communications lines, and computer centers.[12] The deluge of writing about the internet in the 1990s imagines it as a vehicle of social change, ushering in a global era of connectivity, convenience, prosperity, and democracy.[13] Although appeals to the democratizing powers of electricity have long abated, the electric and digital sublime, as parts of the technological sublime, though fading fast, continue to be connected to notions of the internet. A significant example is how China is constantly invoked in discussions of the internet and its potentially democratizing effects.

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[10] Ibid., 220; David Nye, *American Technological Sublime*, 38.

[11] Jonathan Sterne, "Out with the Trash," 19.

[12] James Carey and John Quirk, "The Mythos of the Electronic Revolution," in *Communication as Culture: Essays on Media and Society*, by James Carey (Boston: Unwin Hyman, 1989), 116.

[13] James Carey, "Historical Pragmatism and the Internet," *New Media & Society* 7, no. 4 (2005): 445.

The emergence of the internet in China has received much attention in the West. There are more internet users in China than in any other country in the world, an estimated 338 million in 2009.[14] Even as the Chinese government sees the internet as crucial to its project of economic growth, it closely monitors and regulates it, in what has been dubbed in the West 'the Great Firewall of China.' While there is no doubt that the Chinese government actively oppresses its citizens and controls their use of the internet, Western media and academic discourse tend to fixate solely on the democratic possibilities of the internet, often ignoring other realities of internet use in the Chinese context. As former US President Bill Clinton says, "we know how much the internet has changed America, and we are already an open society. Imagine how much it could change China."[15] News reports in North America on the subject typically report on the relationship between the internet and democracy in China. For example, headlines in a 2010 issue of *Newsweek* proclaim: "You Can't Fight the Future: Why China is No Match for the Internet;" "China's Silicon Ceiling: Free Markets Require Free Minds"; "Clash of the Titans: How the Democratic Republic of Google is Testing China's Appetite for Democracy Itself."[16] Remnants of the rhetoric of the technological sublime remain lurking in implications that China is 'fighting the internet,' synonymous with progress and democracy. Many scholars have noted that the academic literature is polarized around notions about whether the internet is an ultimate tool for state repression or the harbinger of democracy, especially in the Chinese context.[17] Chu and Cheng suggest that much of the research fails to take into account China's unique history and experience of the internet, which is markedly different from most Western nations. For one thing, China is undergoing simultaneous and rapid industrialization and cyberization.[18] Their point is that not only does the Chinese internet need to be studied and understood on its own terms, but that these polarized debates also radically misrepresent what is actually happening on the Chinese internet.

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[14] Rodney Wai-Chi Chu and Chung-Tai Cheng, "Cultural Convulsions: Examining the Chineseness of Cyber China," in *Online Society in China: Creating, Celebrating, and Instrumentalizing the Online Carnival*, eds. David Kurt Herold and Peter Marolt (New York: Routledge, 2011), 24.

[15] Bill Clinton as qtd. in Wenli Yuan, "E-democracy@China: Does It Work?" *Chinese Journal of Communication* 3, no. 4 (2010): 491.

[16] *Time Magazine*, January 25, 2010.

[17] Rodney Wai-Chi Chu and Chung-Tai Cheng, "Cultural Convulsions," 23; Johan Lagerkvist, *After the Internet, Before Democracy: Competing Norms in Chinese Media and Society* (Bern, Peter Lang, 2010), 16; David Kurt Herold, "Introduction: Noise, Spectacle, Politics: Carnival in Chinese Cyberspace," in *Online Society in China: Creating, Celebrating, and Instrumentalizing the Online Carnival*, eds. David Kurt Herold and Peter Marolt (New York: Routledge, 2011), 5.

[18] Rodney Wai-Chi Chu and Chung-Tai Cheng, "Cultural Convulsions," 26.

What the Chinese example demonstrates is that although the computer and internet have become part of everyday use, which usually signals a retreat of the technological sublime, the association between the internet and democracy persists. With the emergence of social media technologies, including Facebook, Twitter, and so on, the fascination with the potential for democratization continues to be associated with ICTs, as can be seen in coverage of the Tahrir Square protests in Egypt in 2011, for example. The potential for democratization and the role these technologies play in the process must be studied, but this enduring and narrow focus can overshadow the other social, political, and material factors at play.

A closer look a the how the discourse of the technological sublime is shaped in mainstream discourse, especially as it relates to these 'new media technologies,' shows that alongside promises of democracy are assurances of ecological harmony. As Al Gore, former US Vice-President, champion of cyberspace, and climate change advocate proclaims:

> I believe that an essential prerequisite to sustainable development, for all members of the human family, is the creation of this network of networks. To accomplish this purpose, legislators, regulators, and business people must do this: build and operate a Global Information Infrastructure. This GII will circle the globe with information superhighways on which all people can travel.... From these connections we will derive robust and sustainable economic progress, strong democracies, better solutions to global and local environmental challenges, improved health care, and - ultimately - a *greater sense of shared stewardship of our small planet*.[19]

Gore's fervent belief in the possibilities for human progress that come with information networks, such as the internet, is typical of the discourse and contains within it a passing comment about environmental sustainability that works to incorporate notions of environmental politics into policies for improved communications networks and technologies.

Even the academic discussions that critically examine the mainstream discourse, such as the statement by Gore, repeat that fleeting reference to the environment, even as they scrutinize the claims made for democracy and other aspects of the discourse. For Carey and Quirk, in the discourse of the electronic sublime, electronics and computers are said to:

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[19] My italics. Al Gore, as qtd. in Vincent Mosco, *The Digital Sublime: Myth, Power, and Cyberspace* (Cambridge, Massachusetts: MIT Press, 2004), 39.

> produce a cornucopia of jobs, markets, and products, to rejuvenate ailing economics, to refund declining universities, to reemploy the unemployed and redundant, to offer vast and satisfying opportunities to those new to the labour force, to *produce environmental harmony as high tech displaces the smokestacks of low tech*, and even eliminate through user friendliness, the last alienation and estrangement between people and their machines.[20]

Vincent Mosco uses the term the digital sublime to describe the myth making associated with the internet. He says: "...ever smaller, faster, cheaper, and better computer and communications technologies help to realize, with little effort, those seemingly impossible dreams of democracy and community *with practically no pressure on the natural environment*."[21] These passing references to the environment are thoughtlessly repeated and remain unexamined in the same academic literature that works to demystify the myths associated with the technological sublime related to democratization and social progress. This omission reinforces the exclusion of environmental concerns from discussions of ICTs and communications in general. The elision of environmental politics in the larger critical analysis signals, not only a blind spot in studies of communications, but also in our understandings of what constitutes politics, democracy, and community.

Vincent Mosco reminds us that myths such as the technological sublime have a tendency to evacuate politics.[22] Because of the mutable nature of the technological sublime as it gets applied to emerging technologies, it helps to conceal or distort the complex effects of new technologies and in particular those externalities, or side effects, such as pollution or waste. The origin of the idea that ICTs, especially computers, are 'clean' or ecologically safe dates back to the emerging semiconductor industry in the 1970s. At that time, Santa Clara, California, once an agricultural region renowned for its fruit production, became the locus of semiconductor production, earning it the moniker, Silicon Valley. Industry leaders promoted the emerging industry as 'clean,' largely due to the absence of emission spewing smokestacks.[23] As a result of the semiconductor industry, Silicon Valley has more Superfund sites – land designated by Environmental Protection Agency for cleanup due to the presence of hazardous

[20] My italics. James Carey and John Quirk, "The Mythos of the Electronic Revolution," 116.
[21] My italics. Vincent Mosco, *The Digital Sublime*, 30.
[22] Vincent Mosco, *The Digital Sublime,* 31.
[23] Leslie A. Byster, and Ted Smith, "From Grassroots to Global: The Silicon Valley Toxic Coalition's Milestones in Building a Movement for Corporate Accountability and Sustainability in the High-Tech Industry" in *Challenging the Chip: Labour Rights and Environmental Justice in the Global Electronics Industry*, eds. Ted Smith, David A. Sonnenfeld, and David Naguib Pellow (Philadelphia: Temple University Press, 2006), 111.

waste – than any other region of comparable size in the US.[24] This dirty history gets lost as hundreds of other regions hoping to replicate the economic successes of the Santa Clara Valley have emerged globally, as seen in the other silicon knock-offs including: Silicon North in Canada; Silicon Fen in Cambridge, England; Silicon Alps in Austria; Silicon Wadi in Israel; Silicon Polder in the Netherlands; Silicon Beach in Vietnam; Taiwan is known as Silicon Island; Bangalore, India is known as India's Silicon Valley. On top of this long history of environmental problems related to semiconductors, e-waste has become one of the most pressing problems related to ICTs. E-waste is collecting in closets, back storerooms, municipal waste dumps, and increasingly it is being shipped from rich to poor countries to become the "fastest growing waste stream in the industrialized world."[25] The growth of trashed electronics is accelerated by policies of planned obsolescence, whereby electronics and their components are rendered obsolete by the release of new and improved, or at least changed, versions that are often not backwards compatible.

For Jonathan Sterne, planned obsolescence means that not only are computers designed to be trash, but they are also "defined by their own future decomposition."[26] Embedded in our ideas of technological obsolescence are that new machines are inescapably and necessarily linked to human and social progress.[27] If we take seriously Sterne's notion that computers and related technologies, or 'new media' technologies, have retained their aura of newness for over forty years and the implications for the discourse of the technological sublime, then the technological sublime functions as a discursive tide constantly receding and advancing. We can see evidence of the technological sublime receding as having current, up-to-the-minute computers has become understood as a professional, economic, social, and institutional necessity, replacing notions of computers or the internet as the harbingers of human progress. The promise of human progress becomes a constantly ebbing future horizon that can only be supplied by a new technological solution.

David Nye suggests that the technological sublime contains within it a future orientation.[28] In their careful examination of the electrical sublime, Carey and Quirk remind us that part of the "futurist mentality" is the belief that social

[24] Elizabeth Grossman, *High Tech Trash: Digital Devices, Hidden Toxics, and Human Health* (Washington: Island Press, 2006), 3.
[25] Basel Action Network as qtd. in Ashley L.B Deathe, Elaine MacDonald, and William Amos. "E-waste Management Programs and the Promotion of Design for the Environment: Assessing Canada's Contributions," *Reciel* 17, no. 3 (2008): 321.
[26] Jonathan Sterne, "Out with the Trash," 17.
[27] Jonathan Sterne, "Out with the Trash," 21.
[28] David Nye, *American Technological Sublime*, 153.

problems are due to problems in communication.[29] In other words, there is a particular correspondence between ideas about the future and communication so that the future of communication brings with it the promise of social harmony, including those appeals to prosperity, democratization, and environmental equilibrium. For Carey and Quirk:

> The future in exhortation becomes a solvent; the very act of moving forward in time constitutes a movement away from past problems and present difficulties. The future becomes a time zone in which the human condition is somehow transcended, politics evaporated, and a blessed stage of peace and democratic harmony achieved.[30]

We turn towards the future of communication, content that present problems, such as environmental issues related to waste and pollution, will be swept away by better communication, rather than by larger structural changes, including improved recycling and waste management programs and policies. This future orientation masks the politics and the problems of the present. We are rooted in a present tense, grounded in immediacy – what's hot, what's now? But also in a linear understanding of time that sees technological progress as a given – what's next, how will it be better? This future orientation reinforces – and stops us from thinking through or even discussing – the terms of the debate. It also maintains what Sterne calls the "public secret" of e-waste.[31]

The complex discursive actions of the technological sublime, including the promise of ecological harmony contained within its future orientation, work to further distract us from our growing waste problems. What is *actually* next for most communications technologies is the trash. In their examination of the temporal aspects of waste management discourse, social theorists Joost van Loon and Ida Sabelis say that: "taking the environment seriously forces social theorists to reconsider the foundations of their disciplines."[32] Because e-waste is literally the future of communications technologies, it not only puts waste management in the purview of theorists dealing with communication, but is also seriously challenges how we theorize communication and its future.

Even as e-waste is not generally taken up by scholars of communication, neither is it contained by current waste management practices or policies. With e-waste (as with many other types of waste), not only are we dealing with past waste in the present, but our present waste is projected forward onto the future. In

[29] James Carey and John Quirk, "The Mythos of the Electronic Revolution," 114.
[30] James Carey and John Quirk, "The Mythos of the Electronic Revolution," 179.
[31] Jonathan Sterne, "Out with the Trash," 27.
[32] Joost van Loon and Ida Sabelis, "Recycling Time," 287.

her work on time and the environment, Barbara Adam suggests that "through industrial activities today, the futures of countless generations are predetermined, their option foreclosed for an untold number of years hence. The future is thus dealt with and eliminated in the present."[33] Our present e-waste policies projects serious ecological problems onto future generations, as the waste of past generations has been thrust upon us. In what follows, I turn to waste management discourse, especially as it relates to recycling, to consider its future discourse and relationship to planned obsolescence, the technological sublime, and communications.

In Canada, where I live, it is estimated that 5 million computers and monitors are disposed of per year.[34] Approximately 140 000 tonnes of electronics end up in Canadian landfill sites annually, although municipal e-waste recycling programs aimed at diverting e-waste from landfill have been introduced and implemented in many places.[35] Waste electronic and electrical equipment (WEEE) is one of the most complex items in the waste stream and challenges many existing waste management practices and policies. E-waste is typically defined as any waste that requires an electric current to operate, including air conditioners, hair dryers, clocks, televisions, toasters, GPS units, fax machines, headphones, stereos, and so on. It is estimated that up to 70 to 90 percent of the material in trashed computers is recyclable or reusable, but they also contain many toxic materials including heavy metals, brominated fire retardants, and other chemicals.[36] Groups such as the Basel Action Network (BAN), a leading activist group working on e-waste, are pushing for extended producer responsibility so that corporations, such as Intel, HP, Apple and others, will become responsible for taking back obsolete computers. Studies have shown that this encourages companies to update product design to facilitate recycling and refurbishing of personal computers.[37] Presently, the European Union has the most stringent rules regulating e-waste and hazardous materials.

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[33] Barbara Adam, *Timescapes of Modernity: The Environment and Invisible Hazards* (London: Routledge, 1998), 57.

[34] Environment Canada, "Mounting Concerns Over Electronic Waste," *EnviroZine: Environment Canada's On-Line Newsmagazine*, 33, no. 1 (2003), accessed May 25, 2010, www. ec.gc.ca/EnviroZine/English/issues/33/print_version__e.cfm

[35] Ibid.

[36] Recycling Council of Ontario, "Computers," Material Fact Sheet Series: A Waste Reduction Week 2000 Initiative (Toronto, Ontario, 2000).

[37] Naoko Tojo, "Design Change in Electrical and Electronic Equipment: Impacts of Extended Producer Responsibility Legislation in Sweden and Japan," in *Challenging the Chip: Labour Rights and Environmental Justice in the Global Electronics Industry*, eds. Ted Smith, David A. Sonnenfeld, and David Naguib Pellow (Philadelphia: Temple University Press, 2006), 273.

The implementation of recycling programs in Canada, the EU, and elsewhere is incredibly necessary and signals important changes to waste management strategies. However, these programs do not typically address past waste or present and future production. In other words, they do not directly address the strain on natural resources with the production of increasing numbers of electronics, whether or not they are built from recycled materials. Nor do they deal with existing materials, going back to the 1950s, that are have not been reclaimed or are sitting in landfill. In general, recycling programs attempt to make waste profitable and to bring it back into the production cycle, what Sabelis and van Loon describe as "a sort bookkeeping model."[38]

This model of recycling is predicated on a linear model of time, in which future profitability comes with the resale of the valuable resources contained within any given machine.[39] For example, Noranda, a Canadian mining company, has established facilities for extracting precious metals, such as the easily recyclable copper and gold, from old circuit boards.[40] The dependable flow of circuit boards, with small amounts of metal, alleviates some of the risk associated with the guesswork of locating viable veins of ore. Deathe, McDonald, and Amos show that in order for e-waste to be profitable recycling plants must have a regular flow of raw materials – or in this case trashed electronics. However, the cost of extracting the usable materials is often higher than the value of that final product.[41] If, or when, recycling becomes economically feasible within the logic of the market, it drives the price of raw materials down, thus increasing productivity, and, again, the production of waste. As discussed above, the policy of planned obsolescence allows companies to plan for future profits as people trash their old machines to buy new ones. There is potential collusion between the practices of planned obsolescence and successful recycling programs that are aimed solely at diverting waste and do not consider the larger strain on resources that comes with current, let alone rising, rates of production. More obsolete and trashed machines potentially equal more raw materials for the recycling industry.

Recycling inserts waste into the logic of capitalism, in an effort to make waste marketable.[42] An Environmental Protection Agency study in the US revealed that it was ten times less expensive to ship a computer monitor to China for recycling than to recycle it in California.[43] More and more, it is poorer

[38] Joost van Loon and Ida Sabelis, "Recycling Time," 292.
[39] Ibid., 294.
[40] Elizabeth Grossman, *High Tech Trash*, 218.
[41] Ashley L.B Deathe, Elaine MacDonald, and William Amos, "E-waste Management Programs," 324.
[42] Joost van Loon and Ida Sabelis, "Recycling Time," 294.
[43] Heather Rogers, *Gone Tomorrow: The Hidden Life of Garbage* (New York: The New Press, 2005), 202.

countries and communities who take on the burden of the garbage from the wealthy, and often in unsafe conditions where workers are exposed to the toxic chemicals as they extract valuable components, usually metals. According to the Basel Action Network, up to 80% of recyclers in the US and Canada take used electronics, pack them into shipping containers, and ship them overseas.[44] Effective since 2008, the Basel Ban prohibits the export of hazardous waste from rich to poor nations. Canada and the US are two of the countries that have not ratified the agreement. The Basel Action Network, the leading activist group that tracks e-waste globally, has issued repeated warnings about companies that illegally export e-waste to countries including China, Nigeria, Ghana, India, Pakistan, Bangladesh, Malaysia, the Philippines, Vietnam, and some countries in eastern Europe and the Middle East, in the guise of donation programs.[45] Waste management, a clinical sounding term, is hardly the phrase that comes to mind when considering people cooking plastic wires over open fires to get at the metal contained within, but it demonstrates how waste often enters the logic of the market. Barbara Adam shows that market logic tends to devalue the future, in order to reap present profits.[46] In this case, exporting e-waste saves rich communities costly updates to their waste management programs, while allowing poorer communities to make money on extracting valuable metals, and it also profits those intermediaries who arrange the import and export of trashed or 'donated' electronics.

Ecologically speaking this gamble with the future becomes even more complex. Barbara Adam uses the term timescape in order to account for the multiple, contingent, and, often incompatible, timescales associated with modernity, nature, technology and the environment.[47] She says:

> Technological products are premised on the Newtonian principles of decontextualization, isolation, fragmentation, reversible motion, abstract time and space, predictability, and objectivity, on maxims that stand opposed to organic principles such as embedded contextuality, networked connectedness, irreversible change and contingency.[48]

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[44] Jim Puckett, Leslie Byster, Sarah Westervelt, Richard Gutierrez, Sheila Davis, Asma Hussain, Madhumitta Dutta, "Exporting Harm the High Tech Trashing of Asia," Report (Seattle: Basel Action Network and The Silicon Valley Toxics Coalition, 2002), 4.

[45] Elizabeth Grossman, *High Tech Trash*, 189.

[46] Barbara Adam, *Timescapes of Modernity: The Environment and Invisible Hazards* (London: Routledge, 1998), 74-75.

[47] Ibid., 56.

[48] Ibid., 41.

Assumptions about reversibility and linear time inform the recycling model of waste management because it assumes that all or most of the waste can be reclaimed. Reversibility, in particular, is an assumption that what came be made can also be unmade, with no danger of other negative consequences. Many substances in e-waste, such as synthetic chemicals, plastics and heavy metals, are toxic and have long term, unknown, or indeterminate effects.

If not treated properly, the materials in e-waste can leach into the groundwater and cause serious health problems in humans including damage to the kidneys, nervous system, DNA, bone structure, brain, allergic reactions, blood disorders and hormonal interference.[49] The groundwater in Guiyu, China, the biggest e-waste dump in the world has become so contaminated that water must be shipped in. Even in safe and high-tech recycling facilities, the recycling model of waste management does not account for the waste products produced by the recycling process itself, nor those materials that are not recyclable and therefore resulting in higher concentration of toxic residues.[50] We are burdening future generations with more and more contaminated land and possible health problems, not to mention fewer natural resources or potential solutions to neutralize long-term toxicity and pollution.

To take but one example, plastics pose problems to waste management practices not only because of their sheer volume in the waste stream, but also because they do not biodegrade and pose so many unknown and unpredictable outcomes. Although they have been in circulation since the 1950s, it is only since the 1980s that their connections to health problems have begun to be understood and documented. Some plastics have been found to contain estrogen mimicking compounds have been linked to endocrine disruption. These substances challenge traditional toxicology that suggests toxic substances are more dangerous in large quantities. Endocrine disruptors throw this model into disarray because they their effects can be transgenerational and can depend on the timing of exposure.[51] Not only do plastics defy the logic of toxicology, but they also exceed the limits of waste diversion programs, which simply do not address the potential health issues associated with these materials. Even when these items are properly disposed, recycled, and returned to market in the form of products, their environmental and health risks are not contained. Thus far, there are no signs that any existing recycling or disposal techniques can reverse their negative health and ecological effects, nor their potential harm to future generations.

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[49] Ashley L.B Deathe, Elaine MacDonald, and William Amos, "E-waste Management Programs," 323.

[50] Joost van Loon and Ida Sabelis, "Recycling Time," 299.

[51] Susan Freinkel, *Plastic: A Toxic Love Story* (New York: Houghton Mifflin Harcourt, 2011), 93.

Both the discourses of waste management and the technological sublime succumb to the lure of a technological fix, turned toward the promise of the future rather than engaging in long-term planning for the future. Whereas the discourse of the technological sublime, ignoring present problems, assumes technology will bring with it a future of ecological harmony, waste management discourse is rooted in a present-oriented, market logic, discounting, in Adam's words, the future. When considering the problem of e-waste, these two discursive positions seem rooted together, facing opposite directions and reinforcing the other's blind spots. Neither of these discourses, nor much of the larger discourse of communication, adequately addresses environmental issues, including waste and pollution, when considering the future of communication.

As Mosco suggests in his discussion of the digital sublime:

> Critically examining myths of cyberspace may help us to loosen the powerful grip of myths of the future on the present. It may lead us to question the naturalized tendency to see the future as the pure extension of logic, technical rationality, and linear progress, and other bulwarks against the primitive forces of instinct and intellectual poverty that have historically weighed against human accomplishment.[52]

We need to move past the tyranny of the new associated with 'new media' technologies towards a more thorough understanding of the complex, interrelated, and often contradictory effects of ICTs as they enter into the social to become entrenched in our educational, economic, and political activities and institutions.

Given the geopolitics of toxicity and risk whereby the penetration of the communications technologies on a global scale is inversely correlated to the environmental risks associated with these devices, especially with respect to e-waste, the future of communication studies must be global in scope. Reframing the terms of the discussion to consider the geopolitics of toxicity and risk associated with these machines enables a more thorough account of the global production of ICTs, their penetration rates, and their patterns of disposal. This reconfiguration must go beyond improved communication about environmental matters, or more and better discussions about the environment. It must also go beyond communicating in more 'environmentally friendly' ways, such as lowering our carbon footprint or recycling. These changes are, of course, worthwhile and necessary. However, the future of communication requires a radical reconfiguration of how we interact with technology and how we interact through technology. The future of communication is intimately connected to international economic and political infrastructures that are especially relevant when

[52] Vincent Mosco, *The Digital Sublime,* 15.

considering the global nature of environmental problems related to pollution and waste. The future of communication is tied to the future of the planet.

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